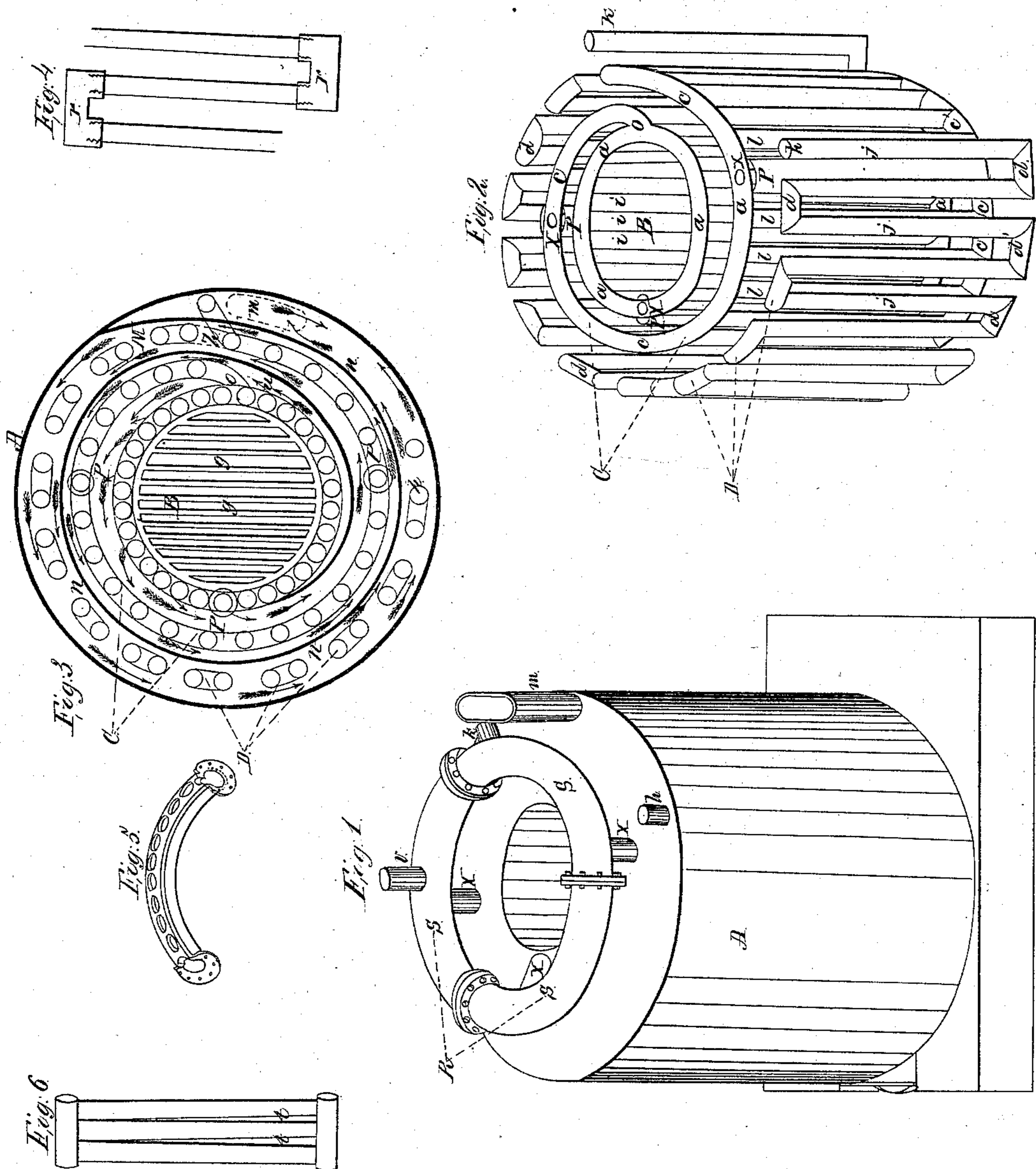


H. Jackson,
Steam-Boiler Water-Tube.

N^o 11,377.

Patented July 25, 1854.



UNITED STATES PATENT OFFICE.

HENRY JACKSON, OF ELIZABETH TOWNSHIP, OHIO.

IMPROVED STEAM-BOILER.

Specification forming part of Letters Patent No. 11,377, dated July 25, 1854.

To all whom it may concern:

Be it known that I, HENRY JACKSON, of the township of Elizabeth, Miami county, and State of Ohio, have invented a new and Improved Steam-Boiler; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and the letters of reference marked thereon, making a part of this specification, in which—

Figure 1 is a perspective view of the boiler-case, steam-reservoir, and connections. Fig. 2 is a perspective view of the generator and heater attached thereto. Fig. 3 is a horizontal section of the generator, heater, return-pipe, and coiled diaphragm in connection with the outside case forming the flue; Fig. 4, a vertical section of the heater; Fig. 5, a section of the bottom and top connecting-coil of the generator. Fig. 6 is a vertical section of the fire-box.

The nature of my invention consists in combining in a steam-boiler greater strength than any in common use, by which the pressure of the steam and consequent power of the engine may be increased without the liability to explosion, a greater amount of heating-surface with less metal, economy of space, and a saving of heat which is ordinarily wasted.

The above-mentioned objects I accomplish by means of a boiler composed of tubes and their tubular connections, and so arranged that when in use the water will maintain a constant circulation through them, so that all the heating-surface may be employed for use and at the same time free from the liability to become overheated; also, by constructing a reservoir of a tubular or other suitable form so arranged and so connected with the generator that the steam may pass into it and thereby the water separated therefrom which has been carried along with it from the generating-tubes and allowing the same to be conveyed back into the lower part of generator in order to obviate priming, and, also, by constructing a series of tubes and so arranging them that by means of which the heat remaining in the products of combustion after they have left the generator proper will be employed for heating the feed-water in the heater on its way to the generator, these said products of combustion passing in one

direction while the feed-water advances in the contrary direction, and, further, by placing the said boiler in a case of metal or other suitable material containing one or more flues so arranged as to cause the products of combustion to circulate freely among the tubes, as well as directing the draft from the top of boiler-case downward through the grate and between the tubes composing the fire-box into the flue, so as to consume all the smoke arising from combustion.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction.

I construct my boiler of tubes and tubular connections F^2 , so constructed and connected as that the whole not only forms nearly a continuous coil of tubes, but that each separate part or tube is so connected with other tubes as to admit the water or steam, as the case may be, to circulate or pass freely from the horizontal connecting-tubes into the vertical tubes, or from the vertical tubes into the horizontal tubes at every joint of connection. The fire-box B is made of slightly-tapering tubes $i i i$, set vertically and connected together at top and bottom with a horizontal circular tube $a a a$, and arranged with the small ends downward and the top or large ends nearly touching each other. This arrangement forms the cylindrical fire-box B, with apertures between the tubes $t t$, Fig. 6, enlarging from the top downward, through which a part of the flame and heat may pass out into the flue and among the tubes of other parts. A coil of tubes $F^2 C$ is then formed, with the vertical tubes $l l l l$ set distant from each other one-half their diameters, or more or less, as is required, and connected at the top and bottom with coiled horizontal tubes $c c c$. This coil is then connected by uniting the inner ends o of the coiled connecting-tubes with the horizontal circular tubes $a a a$ of the fire-box B. This arrangement constitutes the generator proper, and may be made of any length of coil and size and length of tube necessary to produce the amount of steam required.

Outside of the coil C, and which is a continuation of the same, is placed a series of vertical tubes $j j j$ or their equivalents, and connected alternately at top and bottom with horizontal tubes $d d d$ or their equivalents.

This arrangement constitutes the heater D, and is connected *z*, Fig. 3, either at the top or bottom, as the case may be, with the horizontal connecting-tubes *c c c* of the generator.

At suitable distances from each other in the generator D, tubes are surrounded with a metal casing P P P, of sufficient diameter to admit of introducing between the tubes and casing some bad conductor of heat in order to prevent ebullition in these tubes, so that any water which may accumulate in the top horizontal tubes *a a a c c c* may return back into the generator again; or, at suitable distances of interval for the same purpose, I insert within vertical tubes smaller tubes, which will have the same effect.

Above the generator B and C, I place a tubular circular reservoir R, Fig. 1, of capacity corresponding to the purposes for which it is constructed. This reservoir is connected with the generator by tubes *x x x x x*, Fig. 2, so as to admit the steam to pass freely from the generator into the reservoir; also, this reservoir has one or more tubular connections, *k*, Figs. 1, 2, and 3, with the outside of the lower horizontal coil of the generator in order to convey any water which may accumulate in the reservoir back into the generator again.

The manner of uniting the tubes at their various connections may be by brazing or soldering, Fig. 2, or with cast connections, *s s s r r*, Figs. 1, 4, and 5, or other devices, and riveted, bolted, or screwed together, or in any other way equally well calculated to secure strength and durability.

The grate *g g*, Fig. 3, should be placed at or above the bottom of the series of tubes composing the fire-box, and below the grate and fire-box is an ash-pit so arranged and constructed as to admit the flame to pass from the fire-box freely under and from thence into the flue or flues, and also when in use can be closed air-tight.

From the reservoir the steam is taken off, *v*, Fig. 1, at any point most suitable, and also on top of the reservoir may be placed a safety-valve similar to those in common use.

Gage-cocks similar to those in common use may be inserted in one or more of the vertical tubes composing the generator.

I place my boiler thus constructed in a case of metal A, Figs. 1 and 3, having within a coiled diaphragm of metal *u u u u*, attached at one end W to the case A and running around and between the coil formed by the heater and generator, so arranged as to form a flue for the flame and heat to pass from the fire-box and grate along the coil of tubes composing the generator and heater, and thence out at the chimney *m*, Figs. 1 and 3. The case A has an opening at the top for the admission of fuel and the air which is necessary to support its combustion. The draft is from the top downward through the fuel, the grate, and between the tubes composing the fire-box. This arrangement secures the almost perfect combustion of all the fuel, and thus renders it a smoke-consumer.

What I claim as my invention, and desire to be secured by Letters Patent, is not the constructing of a boiler of tubes simply; but I do claim—

1. The arrangement of the vertical water-tubes and spiral flues in relation to the furnace, as herein described.

2. The arrangement of the vertical water-tubes surrounded by the non-conducting material and the upper and lower horizontal tubes in connection with the heating-surfaces for the purpose of returning the water from the upper to the lower tube.

HENRY JACKSON.

Witnesses:

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